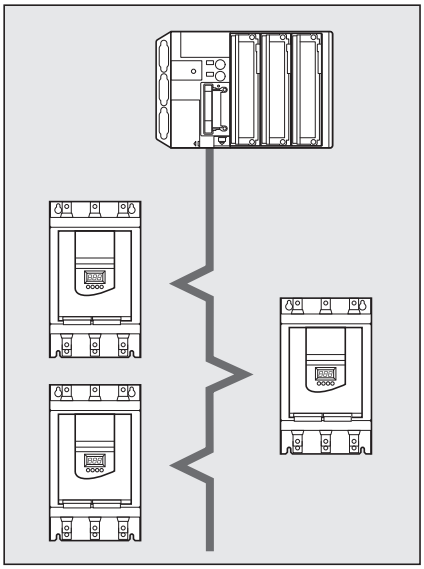
Altistart 48
Guide d'exploitation
User manual

Protocole Modbus
Modbus protocol

10/2009



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Introduction

The Modbus socket on the Altistart 48 can be used for the following functions:

- Configuration
- Adjustment
- Control
- Monitoring

The ATS48 starter supports:

- The RS485 physical layer
- RTU mode

Modbus services, operating modes and communication variables are described in the following sections.

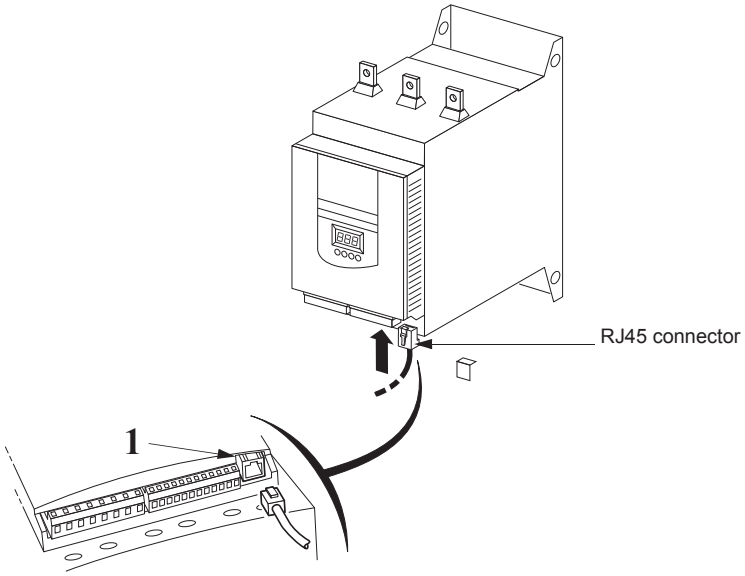
The ATS48 is interchangeable with an ATS46 used in Modbus RTU mode (see ATS46 Compatibility section).

Connection to RS485 Bus

Connection to ATS48

Connection accessories should be ordered separately (please consult our catalogues).

Connect the RJ45 cable connector to the ATS48 connector **1**.



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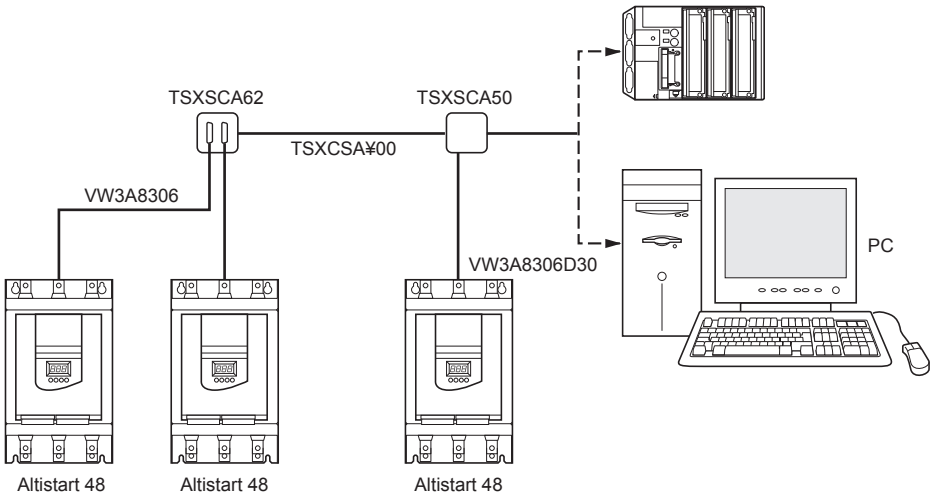
Connection to RS485 Bus

Example of connection

Various accessories are available from the Schneider Automation catalogue to aid connection of equipment. Connection to TSXSCA62 and TSXSCA50 boxes is one example of the different Modbus connection options (please consult our catalogues).

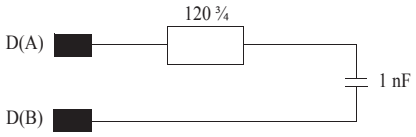
- Shielded double twisted pair cable: TSXCSA100 (100 m)
  TSXCSA200 (200 m)
  TSXCSA500 (500 m)
- TSXSCA62 2-channel subscriber socket: This passive box enables connection to 2 screw terminals and 2 female 15-pin SUB-D connectors. It includes the line termination, required when the socket is located at an end of the line.
- TSXCAS0 junction box: This passive box enables connection to 3 screw terminals. It includes line termination.
- Drop cable: VW3A8306, length 3 m, fitted with 2 connectors (RJ45 and male 15-pin SubD).
  VW3A8306D30, length 3 m, fitted with one RJ45 connector, the other end stripped.



Connection to RS485 Bus

Wiring recommendations

- Use a shielded cable with 2 pairs of twisted conductors
- Connect the reference potentials (0V) to one another
- Maximum length of line: 1000 metres
- Maximum length of tap-off: 20 metres
- Cable routing: Keep the bus away from the power cables (at least 30 cm) with any crossovers at right-angles if necessary, and connect the cable shielding to the ground of each device.
- Fit a line terminator at both ends of the line.

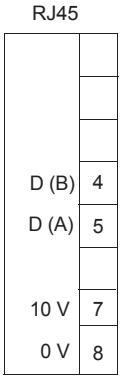


Line termination recommended at both ends of the line

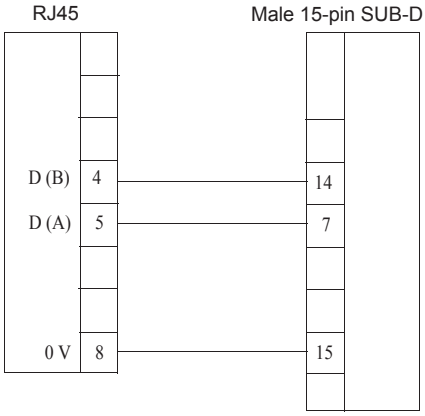
- Each ATS48 integrates two 4.7 kohm pulldown resistors which improve bus immunity.
  If the master is also fitted with 4.7 kohm pulldown resistors, up to 27 starters can be connected.
  If the pulldown resistors on the master are 470 ohm, up to 18 starters can be connected.

Pinouts

- ATS48 socket



- VW3A8306 cable for TSXSCA62



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Modbus Protocol

Configuration of the serial link

Configuration of the serial link parameters can be accessed from the Communication menu [COP]

Parameters	Possible values	Terminal display	Default value
Protocol (COP)	Modbus RTU	RTU	RTU
Address [Add]	0 to 31	000 to 031	0
Speed [tbr]	4800 9600 19200	48 96 192	19200 bps
Format [FOr]	8 data bits, odd parity, 1 stop bit 8 data bits, even parity, 1 stop bit 8 data bits, no parity, 1 stop bit 8 data bits, no parity, 2 stop bits	8O1 8E1 8n1 8n2	8n1

RTU mode

The transmission mode used is RTU mode. The frame contains no message header byte, nor end of message bytes. It is defined as follows:

Slave address	Request code	Data	CRC16

The data is transmitted in binary code.
CRC16: cyclical redundancy check parameter.
The end of the frame is detected if silent for Š 3 characters.

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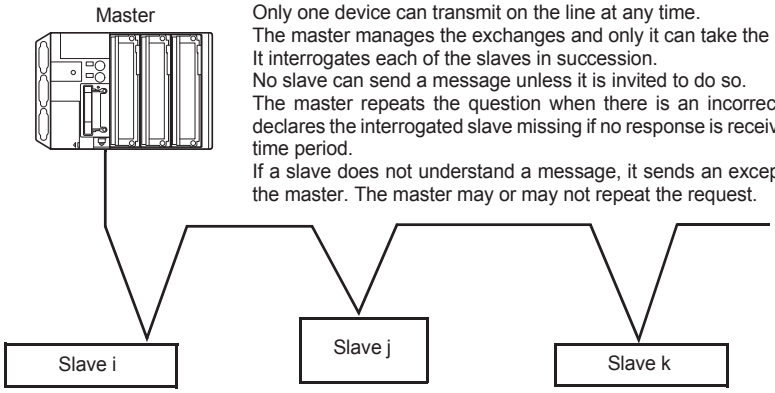
Modbus Protocol

Principle

Modbus protocol is a master-slave protocol.



Only one device can transmit on the line at any time.
The master manages the exchanges and only it can take the initiative.
It interrogates each of the slaves in succession.
No slave can send a message unless it is invited to do so.
The master repeats the question when there is an incorrect exchange, and declares the interrogated slave missing if no response is received within a given time period.
If a slave does not understand a message, it sends an exception response to the master. The master may or may not repeat the request.

Direct slave-to-slave communications are not possible.

For slave-to-slave communication, the application software must have been purposely designed: to interrogate one slave and send back data received to the other slave.

Two types of dialogue are possible between master and slaves:

- the master sends a request to a slave and waits for its response
- the master sends a request to all slaves without waiting for a response (broadcasting principle).

Addresses

The slave address can have a value between 0 and 31.

Address 0:

- Address 0 coded in a request sent by the master is reserved for broadcast communication. All slaves, including the ATS48, take account of the request, but do not respond to it.
- When the ATS48 has been configured with address 0 (default value), it takes account of requests addressed between 1 and 31 and responds to the same address as each of these requests. As a result, the starter behaves as if it were configured on all the possible addresses (1 to 31).
  This default configuration should only be retained if point-to-point connection is being used, ie. mainly with connection to a PC. An address other than 0 should be configured on a Modbus network which includes other slaves.

Addresses 126 and 127:

Addresses 126 and 127 constitute privileged addresses. No Modbus master should therefore use either of these addresses in requests generated on a Modbus network incorporating at least one Altistart 48. Address 126 is reserved for communication with a terminal and address 127 is reserved for exchanges with PowerSuite. Both of these should only be used on a point-to-point link.

Modbus Protocol

Modbus functions

The following table indicates which Modbus functions are managed by the Altistart 48, and specifies their limits. The "read" and "write" functions are defined from the point of view of the master.

Code (decimal)	Function name	Broadcast communication	Max. value of N	Modbus standard name
3	Read N output words	NO	30 words max.	Read Holding Registers
4	Read N input words	NO	30 words max.	Read Input Registers
6	Write one output word	YES	–	Preset Single Register
16	Write N output words	YES	30 words max.	Preset Multiple Regs
65	Identification	NO	–	–

The Identification function is specific to ATV drives and ATS starters.

Modbus Protocol

Read N words: functions 3 and 4

Note: Hi = high order byte, Lo = low order byte.

Read N output words: function 3
Read N input words: function 4

Request

Slave no.	03 or 04	No. of 1st word		Number of words		CRC16	
		Hi	Lo	Hi	Lo	Lo	Hi
1 byte	1 byte	2 bytes		2 bytes		2 bytes	

Response

Slave no.	03 or 04	Number of bytes read	Value of 1st word		-------	Last word value		CRC16	
			Hi	Lo		Hi	Lo	Lo	Hi
1 byte	1 byte	1 byte	2 bytes			2 bytes		2 bytes	

Example: read 4 words W4023 to W4026 (16#0FB7 to 16#0FBA) in slave 2, using function 4, with:
- LO1 = Motor thermal alarm tAI (W4023 = 16#0001)
- AO = Motor current OCr (W4024 = 16#0001)
- ASC = 200% (W4025 = 16#00C8)
- In = 1.0 x starter rating ICL (W4026 = 16#000A)

Request	02	04	0FB7	0004	42C8			
Response	02	04	08	0001	0001	00C8	000A	07B0
		Value of:		W4023	W4024	W4025	W4026	
		Parameters:		LO1	AO	ASC	In	

Write one output word: function 6

Request and response (the frame format is identical)

Slave no.	06	Word number		Value of word		CRC16	
		Hi	Lo	Hi	Lo	Lo	Hi
1 byte	1 byte	2 bytes		2 bytes		2 bytes	

Example: write value 16#000D in word W4043 of slave 2 (ACC = 13 s).

Request and response	02	06	0FCB	000D	3AD6

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Write N output words: function 16 (16#10)

Request

Slave no.	10	No. of 1st word Hi	No. of 1st word Lo	Number of words	Number of bytes	Value of 1st word Hi	Value of 1st word Lo	-------	CRC16 Lo	CRC16 Hi
1 byte	1 byte	2 bytes		2 bytes	1 byte	2 bytes			2 bytes	

Response

Slave no.	10	No. of 1st word Hi	No. of 1st word Lo	Number of words Hi	Number of words Lo	CRC16 Lo	CRC16 Hi
1 byte	1 byte	2 bytes		2 bytes		2 bytes	

Example : write values 20 and 30 in words W4043 and W4044 of slave 2
(ACC = 20 s and DES = 30 s)

Request	02	10	0FCB	0002	04	0014	001E	30F4
Response	02	10	0FCB	0002	3311			

Identification: function 65 (16#41)

This function is used to obtain additional information to the parameters described in the “Product characteristic parameters” section.

Request

Slave no.	41	CRC16 Lo	CRC16 Hi
1 byte	1 byte	2 bytes	

Response

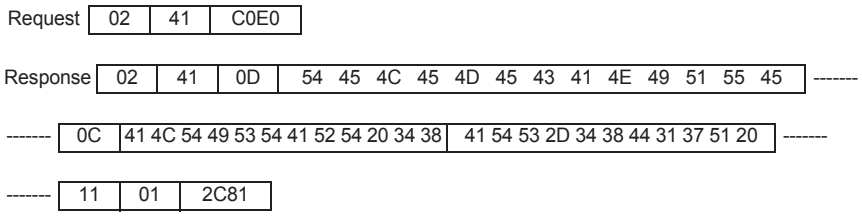
Slave no.	41	Length of name of manufacturer (F)	Manufacturer name (in ASCII) Byte 0	…	Byte F–1	-------
1 byte	1 byte	1 byte	F bytes			

-------	Length of name of product (P)	Product name (in ASCII) Byte 0	…	Byte M–1	Product reference name (ASCII) Byte 0	…	Byte 10	-------
	1 byte	P bytes			11 bytes			

-------	Bits 4-7: Software version Bits 0-3: Version subdeterminant no.	UI (upgrade index of the software)
	1 byte	1 byte

Note: The response to function 6 is always positive, ie. the slave cannot send back an exception response.

Example: following the request from the Modbus master, slave 2 identifies itself as follows:
- Manufacturer name (F = 13 = 16#0D): “TELEMECANIQUE”
- Product name (P = 12 = 16#0C): “ALTISTART 48”
- Product reference name: “ATS48D17Q”
- Software version (version . subdeterminant number): 1.1
- Software upgrade index: 01



Exception responses

An exception response is returned by a slave when it is unable to perform the request which is addressed to it.

Format of an exception response:

Slave no.	Response code	Error code	CRC16 Lo	CRC16 Hi
1 byte	1 byte	1 byte	2 bytes	

Response code: request function code + H'80.

Error code:
1 = The function requested is not recognized by the slave.
2 = The bit or word addresses indicated in the request do not exist in the slave.
3 = The bit or word values indicated in the request are not permissible in the slave.
4 = The slave has started to execute the request but cannot continue to process it completely.

CRC16 calculation

The CRC16 is calculated on all the message bytes by applying the following method:

Initialize the CRC (16-bit register) to 16#FFFF.

Enter the first to the last byte of the message:

```
        CRC     XOR     <byte> —> CRC
        Enter   8 times
                Move the CRC one bit to the right
                If the output bit = 1, enter CRC XOR 16#A001—> CRC
        End
        enter
End
enter
```

The CRC obtained will be transmitted with the low bytes sent first, then the high bytes (unlike the other data contained in Modbus frames).

XOR = exclusive OR.

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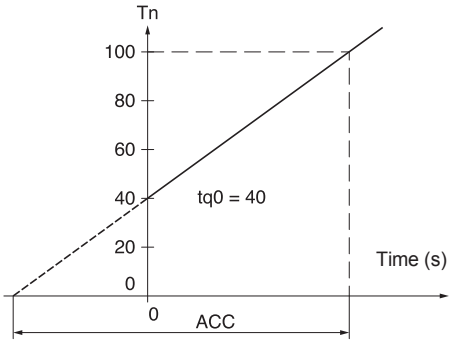
Parameter Representation

Document structure

The information concerning parameters is supplementary to the Altistart 48 – Soft start - soft stop units user's manual. This manual should be consulted for the starter hardware and software setup. The parameters are arranged in the same order in both manuals. Several indices, located at the end of the document, can be used to search for parameter codes in alphabetical order, addresses in ascending order and parameter names in alphabetical order.

Key to tables

<table>
<tr><th>Code
Address</th><th>Name</th><th>Unit</th><th>Range</th><th>Factory setting</th></tr>
<tr><td>TQ0
W4037</td><td>Initial starting torque</td><td>0.1 A</td><td>0 to 100
(% of the nominal
motor torque Tn)</td><td>20</td></tr>
<tr><td></td><td colspan="4">This parameter can only be accessed if CLP is set to On (W4107 = 1).
It can be used to adjust the initial torque level during starting phases.
 
</td></tr>
<tr><td>STY
W4029</td><td>Selection of the stop type</td><td></td><td>0 to 2</td><td>0</td></tr>
<tr><td></td><td colspan="4">The selected type of stop is applied, for example, on deactivating the logic input LI_STOP.
- 0 = -F-: Freewheel stop: No torque is applied to the motor by the starter.
- 1 = -d-: Stop by torque control during deceleration: The starter applies a motor torque for gradual deceleration on the ramp, avoiding a sudden stop if the resistive torque is high (example: water hammer with a pump).
- 2 = -b-: Dynamic braking stop: The starter generates a braking torque in the motor which will slow the motor down if there is considerable inertia.

If the starter is connected to the delta motor winding, stop type b is not permitted.

Note : Soft stopping by control of torque (type d) is available since V1.2IE13.</td></tr>
</table>

"- 0 = -F-: Freewheel stop"
'0' is the parameter value
-F- is the soft starter terminal display

Parameter Representation

Representation of data

The ATV48 parameters are 16-bit words designated by "W…" (…address in decimal notation).
They are used to represent unsigned values (0 to 65535), ie. 16 independent logic states.
In this case, they are called "registers", and the notation for their bits is "W…:xk" (k bit number, from 0 to 15).

Example:
W4028 = Voltage boost level
W402 = Status register
W402:X2 = Bit 2 of the status register

Values given in hexadecimal notation are written as 16#…
This notation is equivalent to the H…, H'…', …k and 0x… notations sometimes used in other documents.
2#… … … … is binary representation.

Access to data

Some parameters can be accessed in both write mode and read mode: these are the parameters corresponding to adjustments, configurations or commands. These parameters are used by the starter.

Data generated by the starter can only be accessed in read mode: signalling and fault information, etc. Any attempt to write it results in nonsense, which the starter will reject.

Initializing values

On each power-up, the Altistart 48 is initialized with the configuration and adjustments stored in its EEPROM memory.

When LINE Mode is active, the following commands can be performed on the parameters:
- Storage of these adjustments in the EEPROM is controlled via Bit 1 of CMI (W402:X1), active on rising edge 0 Õ 1.
- Return to factory settings is controlled via Bit 0 of CMI (W402:X0), active on rising edge 0 Õ 1.
- Return to adjustments previously stored in the EEPROM (using Bit 1 of CMI) is controlled via Bit 2 of CMI (W402:X2), active on rising edge 0 Õ 1.

Reserved parameters

Only the addresses and values defined in this document can be used. Any other address or value must be considered to be reserved and must never be written. Failure to observe this precaution may result in starter malfunctions.

Reading an existing memory zone which is not assigned to a parameter returns a value of 16#8000.

Control Modes

Description of Control Modes

The Altistart 48 can be controlled in three different modes:

- LOCAL mode: The starter is entirely controlled via the terminals. The parameters can be read and written via Modbus. Writing the control register does not affect starter operation.
- FORCED LOCAL mode: The starter is entirely controlled via the terminals. Write access to the parameters from the Modbus link is prohibited. Reading is possible.
- LINE mode: The starter is entirely controlled by the control register.
  Only the STOP logic input remains active at the terminals and has priority.
  There are two LINE mode profiles:
  - DRIVECOM profile
  - ATS46 profile
  The DRIVECOM profile is compatible with applications developed for variable speed drives. The ATS46 profile is reserved for compatibility with the ATS46 soft starter (see "ATS46 compatibility" section).

A control mode is said to be active at a given moment if it determines the starter status.

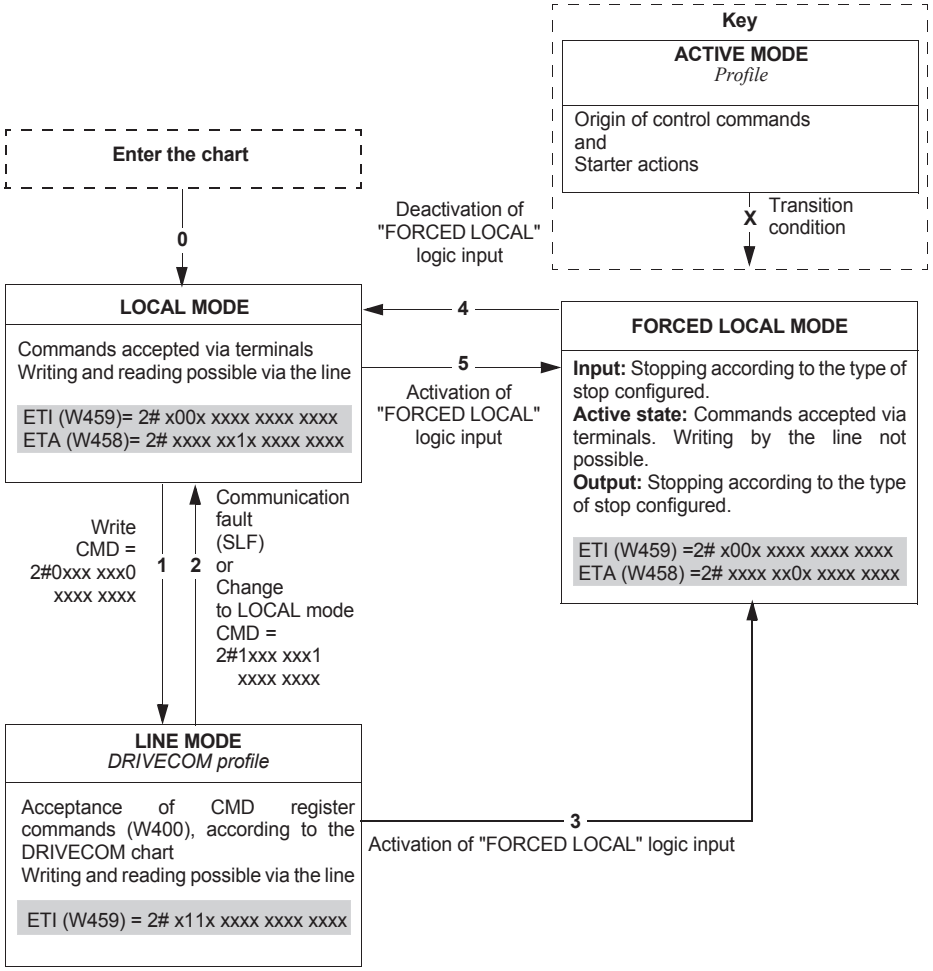
Control mode parameter settings

The following parameters are some of those which it is useful to be familiar with in order to manage an Altistart 48 when LINE mode is active.

Parameter	Address	Type	Description
Bits 8 and 15 of CMD	W400:X8 W400:X15	Control	Bit 8=0 and Bit 15=0 → LINE mode/Drivecom profile. Bit 8=1 and Bit 15=1 → LOCAL mode.
CMI.NTO	W402:X14	Control	Suppression of Modbus link control.
LI3 LI4	W4022 W4048	Configuration	Assignment of logic input LI3 or LI4, to FORCED LOCAL (LIL / value = 4).
STY	W4029	Configuration	Setting the stop type parameters via LI_STOP or the control register. The selected stop is applied to the FORCED LOCAL input and to the output.
Bit 14 of ETI	W459:X14	Monitoring	LINE mode activity indicator (indicator active at 1).
Bit 9 of ETA	W458:X9	Monitoring	FORCED LOCAL activity indicator (indicator active at 0).
Bit 0 of IOL Bit 9 of IOL	W4066:X0 W4066:X9	Monitoring	State of logic input LI3 (Bit 0) or LI4 (Bit 9). (0 = low state, 1 = high state)

Control Modes

Control modes status chart


Key
ACTIVE MODE
Profile
Origin of control commands
and
Starter actions
X
Transition condition
Enter the chart
0
Deactivation of "FORCED LOCAL" logic input
LOCAL MODE
Commands accepted via terminals
Writing and reading possible via the line
ETI (W459)= 2# x00x xxxx xxxx xxxx
ETA (W458)= 2# xxxx xx1x xxxx xxxx
4
5
Activation of "FORCED LOCAL" logic input
FORCED LOCAL MODE
Input: Stopping according to the type of stop configured.
Active state: Commands accepted via terminals. Writing by the line not possible.
Output: Stopping according to the type of stop configured.
ETI (W459) =2# x00x xxxx xxxx xxxx
ETA (W458) =2# xxxx xx0x xxxx xxxx
Write CMD = 2#0xxx xxx0 xxxx xxxx
1
2
Communication fault (SLF) or Change to LOCAL mode CMD = 2#1xxx xxx1 xxxx xxxx
LINE MODE
DRIVECOM profile
Acceptance of CMD register commands (W400), according to the DRIVECOM chart
Writing and reading possible via the line
ETI (W459) = 2# x11x xxxx xxxx xxxx
3
Activation of "FORCED LOCAL" logic input

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Control Modes

Communication fault

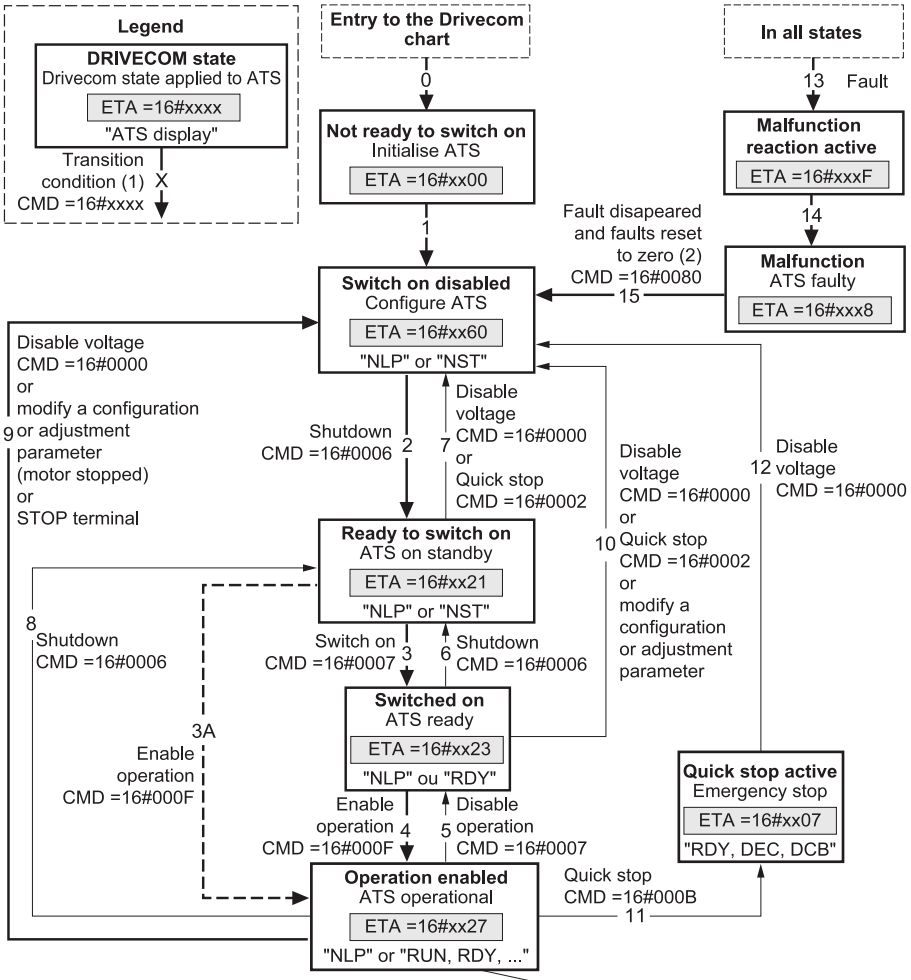
The starter changes to LINE mode as soon as the control register is received (transition 1 on the chart).

For LINE mode to remain active, it is necessary to send messages to the starter regularly. A message (irrespective of type) must be received at least every 2 seconds; this minimum period can be adjusted using the timeout adjustment parameter for the TLP serial link (W2295 max. value = 60 s). It may be necessary to modify this parameter if there are a number of subscribers on the same Modbus network. If no message is received, this causes a starter serial link fault, SLF (W4200 = 5), change from LINE mode to LOCAL mode, as well as reinitialization of the CMD (W400) and CMI (W402) control registers in the starter.

The CMI.NTO bit (W402:X14), active at 1, can be used to inhibit communication control. If NTO = 1, the starter no longer takes account of communication errors coming from the RS485 serial link (Modbus link), and the SLF fault never appears. For obvious safety reasons, use of the NTO bit should be reserved for the debug phase or for special applications.

DRIVECOM Profile

DRIVECOM status chart



Exemples : CMD =16#100F : Stop (parameter or STY) CMD =16#000F : Run CMD =16#080F : Activation of cascade function CMD =16#200F : Braked stop CMD =16#400F : Decelerated stop	Exemples : ETA =16#0227 : Motor running ETA =16#0270 : No power to ATS terminal ETA =16#02A7 : Alarm present
The exit of "Operation enabled" causes a freewheel stop, whatever the transition	

(1) The CMD and ETA register values are only given as examples. See following pages for description of these register bits.

(2) With automatically resettable faults:
On an automatic reset, the status chart changes from the "Malfunction" state to the "Switch on disabled" state without it being necessary to issue a fault reset command.

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DRIVECOM Profile

The status chart changes according to control register CMD (W400), or following the appearance of an event (for example: excessive starting time). The starter status is given by status register ETA (W458).

Not ready to switch on (Initialization):
This state characterizes initialization of communication, once power is supplied to the Altistart 48. It is not visible, since it constitutes a transient state which occurs during initialization.

Switch on disabled (Configuration):
The starter is locked.
The configuration and adjustment parameters can be modified.
If all or part of the configuration and adjustments are to be loaded, we recommend disabling the parameter consistency check function during parameter transfer by activating Bit 15 of CMI (W402:X15 = 1). Once the transfer is complete, the consistency check should be enabled by deactivating the same boolean operator (W402:X15 = 0); the check is then made immediately and affects all parameters.

Ready to switch on and **Switched on**:
The starter is locked.
The configuration and adjustment parameters can be modified. But if any of them are modified while in the "Switched on state", this causes a return to the “Switch on disabled” state.

Operation enabled (Operational):
The starter drive functions are activated.

This is the only state in which the voltage upstream of the starter is possibly applied to the motor terminals.
In all states, the power supply can be applied. It is possible to reach the "Operation enabled" state without the power supply having been established. Bit 4 of ETA (W458:X4) is used to determine whether the voltage is applied (0) or not (1) to the starter terminals. The starter display unit indicates “NLP” if the power supply is missing.

The configuration and adjustment parameters can only be modified when the motor is stopped and no voltage is applied to the motor terminals. Modification of one of these parameters causes a return to the “Switch on disabled” state.
Only the control parameters can be modified while the motor is powered up and running. Any attempt to write the value of a configuration or adjustment parameter will be rejected if voltage is applied to the motor terminals.

Quick stop active (Emergency stop active):
Freewheel stop.
Restarting is only possible after changing to the “Switch on disabled” state.

Malfunction reaction active (Reaction on fault):
Transient state during which the starter performs an action appropriate to the type of fault.
Freewheel stop.
The drive function is disabled.

Malfunction (Fault):
Faulty starter.
End of freewheel stop caused by change to the previous state "Malfunction reaction active".
The drive function is disabled.

DRIVECOM Profile

CMD control register (W400)

Bit 15	Bit 14	Bit 13	Bit 12
0 (Drivecom)	Decelerated stop	Braked stop (BRL)	Stop (STY)

Bit 11	Bit 10	Bit 9	Bit 8
Activation of cascade function	0	0	0

Bit 7	Bit 6	Bit 5	Bit 4
Reset faults (0 → 1)	0	0	0

Bit 3	Bit 2	Bit 1	Bit 0
Enable operation	Quick stop (active at 0)	Disable Voltage (active at 0)	Switch on

Command	Transition address	Final state	Bit 7 Reset faults	Bit 3 Enable operation	Bit 2 Quick stop	Bit 1 Disable voltage	Bit 0 Switch on	Example of CMD (W400)
Shutdown	2, 6, 8	Ready to switch on	x	x	1	1	0	16#0006
Switch on	3	Switched on	x	x	1	1	1	16#0007
Enable operation	4	Operation enabled	x	1	1	1	1	16#000F
Disable operation	5	Switched on	x	0	1	1	1	16#0007
Disable voltage	7, 9, 10, 12	Switch on disabled	x	x	x	0	x	16#0000
Quick stop	11	Quick stop active	x	x	0	1	x	16#0002
	7, 10	Switch on disabled						
Fault reset	15	Switch on disabled	0 Õ 1	x	x	x	x	16#0080

x State not significant
0 Õ 1 Change from 0 to 1

Normally, different stops should not be requested in the same command. However, the following order of priority is applied:
- Freewheel stop (higher priority)
- …
- …

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ETA status register (W458)

Bit 15	Bit 14	Bit 13	Bit 12
0	0	0	0

Bit 11	Bit 10	Bit 9	Bit 8
0	0	Line mode control	0

Bit 7	Bit 6	Bit 5	Bit 4
Alarm	Switch on disabled	Quick stop (active at 0)	No power *

Bit 3	Bit 2	Bit 1	Bit 0
Malfunction	Operation enabled	Switched on	Ready to switch on

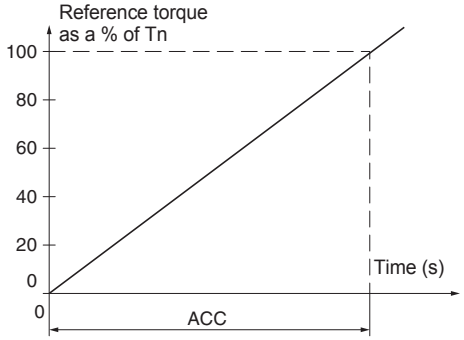
* This status bit corresponds to the “Voltage disabled” item (active at 1) of the Drivecom generic profile. With the starter, if this bit is at 0, it means that the line voltage is applied upstream. If it is at 1, the starter is not receiving this voltage; its terminal display then indicates “NLP”, if no other display has higher priority (fault, for example).

State	Bit 6	Bit 5	Bit 3	Bit 2	Bit 1	Bit 0	ETA (W458)
	Switch on disabled	Quick stop	Malfunction	Operation enabled	Switched on	Ready to switch on	Masked by 16#006F
Not ready to switch on	0	x	0	0	0	0	16#0000 16#0020
Switch on disabled	1	x	0	0	0	0	16#0040 16#0060
Ready to switch on	0	1	0	0	0	1	16#0021
Switched on	0	1	0	0	1	1	16#0023
Operation enabled	0	1	0	1	1	1	16#0027
Malfunction	0	x	1	0	0	0	16#0008 16#0028
Malfunction reaction active	0	x	1	1	1	1	16#000F 16#002F
Quick stop active	0	0	0	1	1	1	16#0007

x: Can take the value 0 or 1

Adjustment Parameters

The adjustment parameters can be accessed in both read and write mode. These parameters can only be modified with the motor stopped. They correspond to those parameters which can be accessed from the starter terminal SEt menu.

Code Address	Name	Unit	Range	Factory setting
IN W4026	**Nominal motor current**	0.1 A	0.4 to 1.3 ICL	(1)
	Adjust the value of the nominal motor current indicated on the rating plate, even if the starter is connected in the motor delta winding (dLt in the PrO menu). Check that this current is between 0.4 and 1.3 ICL (ICL: Starter rating (W4503)).			
ILT W4039	**Limiting current**	%	150 to 700	400
	The limiting current ILt is expressed as a % of In. It is limited to 500 % of the starter rating ICL (W4503). Limiting current = ILt x In. Example 1: In = 22 A, ILt = 300%, limiting current = 300% x 22 A = 66 A Example 2: ATS 48C21Q, with ICL = 210 A In = 195 A, ILt = 700%, limiting current = 700% x 195 = 1365, limited to 500% x 210 = 1050 A			
ACC W4043	**Acceleration ramp time**	s	1 to 60	15
	This is the rise time for the starting torque between 0 and the nominal torque Tn. 			

(1) ATS48•••Q: The factory setting of IN corresponds to the usual value of a 4-pole 400 V standardized motor with class 10 protection (see parameter THP / W4034).
ATS48•••Y: The factory setting of IN corresponds to the usual value of a 460 V standardized motor according to NEC, with class 10 protection (see parameter THP / W4034).

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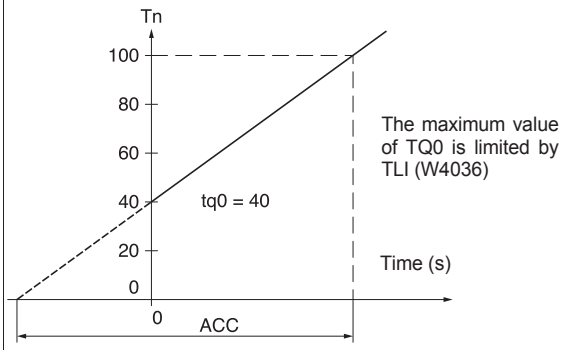
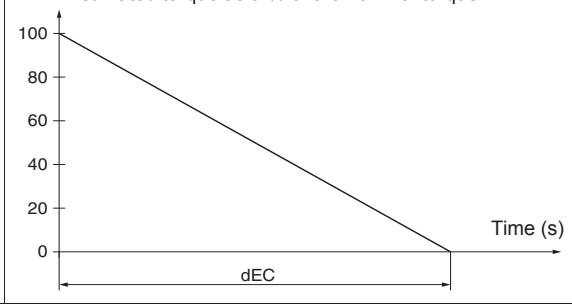
Code Address	Name	Unit	Range	Factory setting
TQ0 W4037	**Initial starting torque**	%	0 to 100	20
	This parameter can only be accessed if CLP is set to On (W4107 = 1). Initial torque setting during the starting phases, varies from 0 to 100% of the nominal torque Tn. 			
STY W4029	**Selection of the stop type**		0 to 2	0
	The selected stop type is applied, for example, when the logic input LI_STOP is deactivated. - 0 = -F-: Freewheel stop: No torque is applied to the motor by the starter. - 1 = -d-: Decelerated stop using torque control. The starter applies a motor torque for gradual deceleration on the ramp, avoiding a sudden stop. This stop type is an effective means of reducing water hammer in a pump. - 2 = -b-: Dynamic braking stop: The starter generates a braking torque in the motor which will slow the motor down if there is significant inertia. Only stop type -F- is authorized if the motor delta winding connection function has been selected (DLT = On / W4054 = 1).			
DEC W4044	**Deceleration ramp time**	s	1 to 60	15
	This parameter is only used if a decelerated stop has been configured (STY = -d- / W4029 = 1). It can be used to set a time between 1 and 60 s, for changing from the estimated torque to zero torque. This makes deceleration more or less gradual, and avoids hydraulic shocks in pump applications by modifying the gradient of the torque reference. Estimated torque as a % of the nominal torque 			

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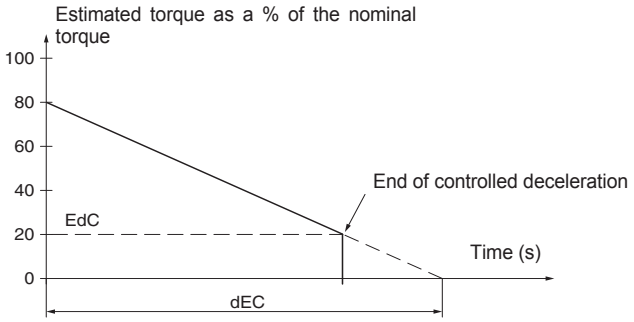
Adjustment Parameters

Code Address	Name	Unit	Range	Factory setting
EDC W4038	**Threshold for changing to freewheel stop mode at the end of deceleration**	%	0 to 100	20
	This parameter can only be accessed if StY = -d- (W4029 = 1) and if parameter CLP in the drive menu (drC) is still set to the factory setting (On) (W4107 = 1). Used to set the final torque level between 0 and 100% of the torque estimated at the beginning of deceleration. In pump applications, deceleration control is not necessarily effective below a load level set by Edc. If the estimated torque at the start of deceleration is below 20, i.e. 20% of the nominal torque, controlled deceleration is not activated, and the motor changes to freewheel mode.  			

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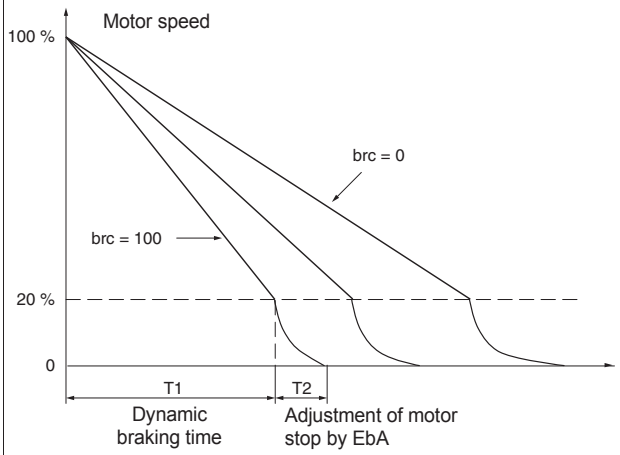
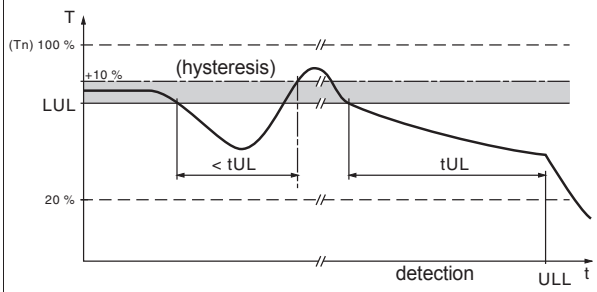
Code Address	Name	Unit	Range	Factory setting
BRC W4041	**Internal braking torque level**	%	0 to 100	50
	This parameter is only used if a dynamic braking stop has been configured (STY = -b- / W4029 = 2). BRC is then used to set the braking current. Braking is active up to 20% of nominal speed. The total motor stop is configured by adjusting the pseudo-continuous current injection time in the motor (on two phases). See next parameter: EBA (W4042).  Pseudo-continuous injection time: T2 = T1 x EBA Note: Time T1 is not determined by BRC. T1 is the time required in seconds for the motor to fall from 100% of the nominal speed to 20% (depends on the motor and application characteristics).			
EBA W4042	**Pseudo-continuous braking time**	%	20 to 100	20
	This parameter is only used if a dynamic braking stop has been configured (STY = -b- / W4029 = 2). EBA is then used to adjust the current injection time at the end of braking. Example: Dynamic braking = 10 s (T1) The stopping time can vary from 2 to 10 s (T2) EBA = 20 → Corresponds to an injection time of 2 s EBA = 100 → Corresponds to an injection time of 10 s			

Protection Parameters

The protection parameters can be accessed in both read and write mode. These parameters can only be modified with the motor stopped. They correspond to those parameters which can be accessed from the starter terminal PrO menu. Exception: RTH appears in the control parameter section.

Code Address	Name	Unit	Range	Factory setting
THP W4034	**Motor thermal protection**		0 to 7	3
	This parameter is only used if the cascade function has been disabled (CSC = Off / W4058 = 0), except for value 0 (OFF: no protection). - 0 = OFF: No protection - 1 = 2 : Sub-class 2 - 2 = 10A: Class 10A - 3 = 10 : Class 10 (standard application) - 4 = 15 : Class 15 - 5 = 20 : Class 20 (severe application) - 6 = 25 : Class 25 - 7 = 30 : Class 30			
ULL W4103	**Activation of motor underload**		0 to 2	0
	In cases where the motor torque is less than the underload threshold LUL (W4104) for longer than the value of TUL (W4105): - 0 = OFF: No protection - 1 = DEF: The starter is locked and the ULF fault (LFT / W4200 = 14) is displayed. If the cascade function has been activated (W4058 = 1 / CSC = on), then ULL is forced from DEF to ALA. - 2 = ALA: An alarm is activated (internal bit and configurable logic output). ⚠ **The alarm monitoring configuration (ALA) indicates the presence of a fault but will not directly protect the installation.** 			
LUL W4104	**Motor underload threshold**	%	20 to 100	60
	This parameter is not available if ULL = OFF (W4103 = 0). LUL can be set at between 20% and 100% of the nominal motor torque Tn (W4503).			
TUL W4105	**Motor underload time**	s	1 to 60	60
	This parameter is not available if ULL = OFF (W4103 = 0). Time delay TUL is activated as soon as the motor torque falls below threshold LUL. It is reset to zero if the torque rises above this threshold LUL by +10% (hysteresis).			

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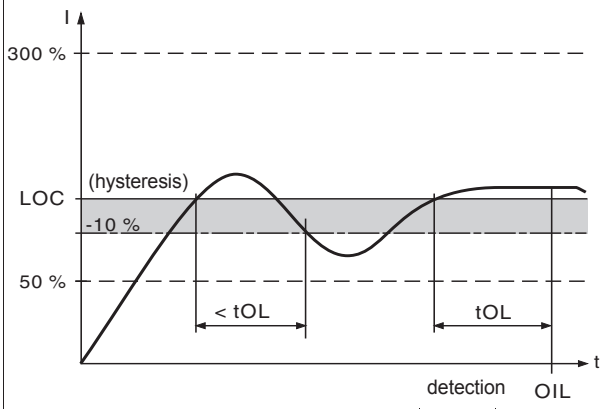
Protection Parameters

Code Address	Name	Unit	Range	Factory setting
TLS W4033	**Excessive starting time**	s	9 to 999	9
	- 9 = OFF: No protection. -10 to 999: Maximum starting time. If the starting time exceeds the value of TLS, the starter is locked and displays the STF fault (LFT / W4200 = 7). The conditions for the end of starting are: line voltage applied to the motor (min. firing angle) and motor current less than 1.3 In.			
OIL W4108	**Activation of current overload**		0 to 2	2
	Function active only in steady state If the motor current exceeds the overload threshold LOC (W4109) for longer than the value of TOL (W4110): - 0 = OFF: No protection - 1 = DEF: The starter is locked and the ULF fault (LFT / W4200 = 14) is displayed. If the cascade function has been activated (W4058 = 1 / CSC = on), then ULL is forced from DEF to ALA. - 2 = ALA: An alarm is activated (internal bit and configurable logic output). ⚠ **The alarm monitoring configuration (ALA) indicates the presence of a fault but will not directly protect the installation.**  			
LOC W4109	**Current overload threshold**	%	50 to 300	80
	This parameter is not used if protection against current overload is inactive (OIL = OFF / W4108 = 0). LOC can be set at between 50% and 300% of the nominal motor current In (W4026).			
TOL W4110	**Current overload time**	0.1 s	1 to 600	100
	This parameter is not used if protection against current overload is inactive (OIL = OFF / W4108 = 0). Time delay TOL is activated as soon as the motor current rises above threshold LOC. It is reset to zero if the current falls back below this threshold LOC by at least 10% (hysteresis).			

Protection Parameters

Code Address	Name	Unit	Range	Factory setting
PHR W4030	**Protection against line phase inversion**		0 to 2	0
	If the line phases are not in the configured order, the starter locks and displays the fault PIF (LFT / W4200 = 4). - 0 = no: No monitoring - 1 = 123 : Forward (L1 - L2 - L3) - 2 = 321 : Reverse (L3 - L2 - L1)			
TBS W4032	**Time before restarting**	s	0 to 999	2
	Avoids starts in too quick succession which may overheat the motor. The time delay starts when the motor changes to freewheel mode. In 2-wire control or control by the control register, the motor is restarted after the time delay if the RUN command input is still enabled. In 3-wire control, the motor is restarted after the time delay if a new RUN command is sent (rising edge). The starter displays “tbS” during the time delay.			
PHL W4101	**Phase loss threshold**	%	5 to 10	10
	If the motor current falls below this threshold in one phase for 0.5 s or in all three phases for 0.2 s, the starter locks and displays the motor phase fault PHF (LFT / W4200 = 9).			
PHP W4102	**Activation of phase loss**		0 or 1	1
	- 0 = OFF: Function inactive. - 1 = On: Function active, the motor current is checked in all three phases. If the cascade function is active (CSC = on/W4058 = 1), then PHP is forced to OFF. ⚠ **PHP must not be disabled when the starter is bypassed by a contactor at the end of starting. In fact, with the control circuit energized, the starter does not detect the loss of line supply, the bypass contactor remains energized, and there is a risk of direct on-line motor restarting when the line reappears.**			
PTC W4106	**Activation of motor thermal monitoring by PTC probes**		0 to 2	0
	The PTC probes on the motor must be connected to the correct analog input. This protection is independent of the calculated thermal protection (parameter THP (W4034)). Both these protections can be used at the same time. - 0 = OFF: No protection - 1 = DEF: The starter is locked and the OTF fault (LFT / W4200 = 18) is displayed. - 2 = ALA: An alarm is activated (internal bit and configurable logic output). ⚠ **The alarm monitoring configuration (ALA) indicates the presence of a fault but will not directly protect the installation.**			

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Protection Parameters

Code Address	Name	Unit	Range	Factory setting
ARS W4100	**Automatic restart**		0 or 1	0
	After locking on a fault, if the fault has disappeared and the other operating conditions permit restarting. - 0 = OFF: Function inactive; manual reset (Factory setting). - 1 = On: Function active; automatic reset. A series of automatic attempts are made to restart the starter at intervals of 60 s. If a restart has not been possible after 6 attempts, the procedure is abandoned and the starter remains locked until it has been switched off or manually reset. The faults which authorize this function are phase fault PHF (LFT / W4200 = 9) and frequency fault FRF (LFT / W4200 = 13), loss of control supply fault CLF (LFT / W4200 = 21) and voltage fault USF (LFT / W4200 = 8). The starter fault relay remains energized if this function is active. The run command must be maintained. This function can only be used in 2-wire control. ⚠ **Check that an accidental start will not endanger personnel or equipment in any way.**			
RTH W4402	**Reset motor thermal state**		0 or 1	0
	This thermal state is calculated by the starter - 0 = no: Function inactive. - 1 = YES: Reset.			

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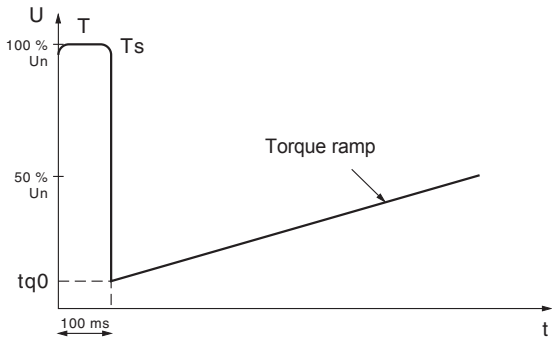
Advanced Adjustment Parameters

The adjustment parameters can be accessed in both read and write mode. These parameters can only be modified with the motor stopped. They correspond to those parameters which can be accessed from the starter terminal drC menu.

Code Address	Name	Unit	Range	Factory setting
TLI W4036	**Maximum torque limit**	%	9 to 200	9
	This parameter is only used when torque control is displayed (CLP / W4107 = 1). It is used to limit the torque reference to avoid regenerative behaviour in applications with high inertia. Can be used for constant torque starting if TQ0 (W4037) = TLI. -9 = OFF: No limit. - 10 to 200: Limit set as a % of the nominal torque Tn.			
BST W4028	**Voltage boost level**	%	49 to 100	49
	An adjustable voltage can be applied when a run command is present for 100 ms. Once this time has elapsed, the starter follows a standard acceleration ramp beginning at the initial starting torque value TQ0 (W4037). This function can be used to avoid any “starting” torque (phenomenon caused by friction on stopping or mechanical incident). -49 = OFF: Function inactive -50 to 100: Set as a % of the nominal motor voltage Un  **If the starter is oversized (motor Im > ATS48 Im), too high a value of the bSt parameter may cause the starter to lock on an OCF fault.**			

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Advanced Adjustment Parameters

Code Address	Name	Unit	Range	Factory setting
DLT W4054	**Starter with delta winding connection**		0 or 1	0
	This parameter can only be modified in ATS48•••Q or ATS48•••YS316 starters, and serves no purpose in other models. This configuration enables the starter power to be uprated by 1.7, but does not allow dynamic braking. - 0 = OFF: Normal line connection - 1 = On: Connection in the motor delta winding The nominal motor current In is the same as that specified on the motor rating plate and the current displayed corresponds to the current of the line supply. The value of the nominal current In is the same as the value on the motor rating plate for the delta connection. The starter performs the conversion itself to control the current in the windings. ⚠ • **With this function, dynamic braking stop is not possible.** • **Cascading is not possible** • **Preheating is not possible.**			
SST W4057	**Test on small motor**		0 or 1	0
	To check the starter in a test or maintenance environment, on a motor whose power is very much lower than the starter rating (in particular for high-power starters). The torque control parameter CLP (W4107) is automatically disabled. - 0 = OFF: Function inactive - 1 = On: Function active **SST returns to the OFF state as soon as the control voltage is disconnected. On the next power-up, the motor phase fault PHF and parameter CLP return to their initial configuration.**			
CLP W4107	**Torque control** (type of control)		0 or 1	1
	- 0 = OFF: Function inactive; starting and deceleration are controlled by voltage variation. - 1 = On: Function active; starting and deceleration follow the torque ramp. Voltage control (CLP = OFF) is recommended for applications which use motors in parallel on one starter or a motor whose power is very low in relation to the starter rating (use of an undersized motor to test the starter).			
LSC W4027	**Stator loss compensation**	%	0 to 90	50
	Parameter active in acceleration phases (and deceleration phases if StY = -d- / W4029 = 1). In the event of torque oscillations, reduce this parameter gradually until the device is functioning correctly. Oscillations are most common if the starter is connected in the delta winding or in motors with excessive slip.			
TIG W4047	**Deceleration gain** (for torque control)	%	10 to 50	40
	This parameter is only used with torque control (CLP = On / W4107 = 1) and when a decelerated stop has been configured. (STY = -d- / W4029 = 1). Used to eliminate instability during deceleration. Adjust the parameter in accordance with the oscillations.			

Advanced Adjustment Parameters

Code Address	Name	Unit	Range	Factory setting
CSC W4058	**Activation of the cascade function**		0 or 1	0
	- 0 = OFF: Function inactive. This function can be used to start and decelerate a number of identical motors in succession with a single starter. - 1 = On: Function active This parameter is only used if: • The R1 relay has already been assigned to the “isolating relay” function (R1 = rIl / W4050 = 1) • The “forced freewheel stop” function is not configured (LI3 and LI4 ≠ LIA / W4022 and W4048 ≠ 1) • The “starter connection in delta winding” function is not configured (DLT = OFF / W4054 = 0) • The "preheating" function is not configured (LI3 and LI4 ≠ LIH / W4022 and W4048 ≠ 3) Note: 255 motors max.			
ULN W4055	**Line voltage**	V	170 to 440 (ATS48••Q) or 180 to 750 (ATS48••Y)	400 (ATS48••Q) or 460 (ATS48••Y)
	This parameter is used to calculate the displayed power: active power as a % LPR (W4072) and active power in kW LAP (W4073). The display will only be accurate if this parameter has been set correctly.			
FRC W4056	**Line frequency**		0 to 2	0
	- 0 = AUt: Automatic recognition of the line frequency by the starter with frequency fault monitoring tolerance FRF (LFT / W4200 = 13) of ±5%. - 1 = 50 : 50 Hz (frequency fault monitoring tolerance FrF of ± 20%) - 2 = 60 : 60 Hz (frequency fault monitoring tolerance FrF of ± 20%) Selections “50” and “60” are recommended if the power supply is provided by a generating set, given their high tolerance.			
RPR W4401	**Reset kWh or the operating time**		0 to 2	0
	- 0 = no: Function inactive - 1 = APH: Reset the power consumption (in kWh) (1) - 2 = trE: Operating time reset to zero APH and trE take effect immediately. The parameter then automatically returns to no.			

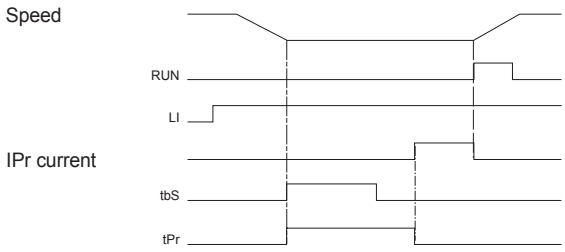
(1) This information « kWh consumed » is only visible with the PowerSuite software workshop or online with Modbus (address W4074)..

I/O Parameters

The I/O parameters can be accessed in both read and write mode. These parameters can only be modified with the motor stopped. They correspond to those parameters which can be accessed from the starter terminal IO menu.
Exception: Parameter R2 (W4051) cannot be modified.

Code Address	Name	Unit	Range	Factory setting
LI3 W4022	**Assignment of logic input LI3**		0 to 9	1

The selected function is active if the input is powered up.
- 0 = no: Input not assigned.
- 1 = LIA: Forced freewheel stop as soon as a STOP command is received. This option is only possible if the cascade function has been activated (CSC = on / W4058 = 1). Forces configuration of a freewheel type stop, but does not control stopping.
- 2 = LIE: External fault. Enables the starter to take account of an external user fault (level, pressure, etc). The motor comes to a freewheel stop and the starter terminal displays EtF (LFT / W4200 = 6).
- 3 = LIH: Motor preheating. This option is only possible if the cascade function has been activated (CSC = on / W4058 = 1). Used to prevent the motor from freezing or to prevent temperature deviations which may cause condensation. When the motor stops, an adjustable current IPR (W4045) flows through it after an adjustable time delay TPR (W4046), if the input has been activated. This current heats the motor without causing it to rotate. IPR and TPR should be adjusted.



Preheating starts when the input is energized and the motor has stopped, after time delays TPR (W4046) and TBS (W4032) have elapsed. Preheating stops if the input is deactivated, if a run command is sent, or if the STOP input is activated.
- 4 = LIL: FORCED LOCAL
- 5 = LIC: Cascade function
- 6 = LII: All protection disabled

⚠ **This type of use invalidates the starter warranty**.

Used to override the starter in the event of an emergency (smoke extraction, for example).
- 7 = LIt: Reset motor thermal fault
- 8 = LIr: Reset faults manually which can be reset
- 9 = LIS: Activation of second set of motor parameters. Used to start and decelerate two different motors in succession or one motor with two different configurations using a single starter.

I/O Parameters

Code Address	Name	Unit	Range	Factory setting
LI4 W4048	**Assignment of logic input LI4**			4
	The description of parameter LI4 is identical to that for parameter LI3 (W4022).			
IPR W4045	**Preheating level**	%	0 to 100	0
	This parameter is displayed after LI3 or LI4 has been assigned to function LIH: motor preheating (W4022 or W4048 = 3). It can be used to set the preheating current. Use a true value current reading ammeter to set the motor current level. The nominal current parameter IN (W4026) does not affect the current IPR.			
TPR W4046	**Time delay before preheating**	s	0 to 999	5
	This parameter is displayed after LI3 or LI4 has been assigned to function LIH: motor preheating (W4022 or W4048 = 3). Preheating starts when the input is energized, after time delays TPR and time before starting TBS (W4032) have elapsed. Preheating can also be controlled by bit 10 of internal control register CMI (W402).			
LO1 W4023	**Assignment of logic output LO1**		0 to 6	1
	- 0 = no: Not assigned. - 1 = tAI: Motor thermal alarm. - 2 = rnI: Motor powered up (indicates that there may be current in the motor). - 3 = AIL: Motor current alarm; Current Overload OIL assigned to ALA (W4108 = 2), threshold LOC (W4109) and time TOL (W4110) exceeded. - 4 = AUL: Motor underload alarm; Activation of motor underload assigned to ALA (W4103 = 2), threshold LUL (W4104) and time TUL (W4105) exceeded. - 5 = APC: Motor PTC probe alarm*. - 6 = AS2: Second set of motor parameters activated.			
LO2 W4049	**Assignment of logic output LO2**			2
	The description of parameter LO2 is identical to that for parameter LO1 (W4023).			
R1 W4050	**Assignment of relay R1**		8 or 9	9
	- 8 = rII: Isolating relay. Relay R1 is designed to control the line contactor using the RUN and STOP commands and to indicate a fault. Relay R1 is activated by a RUN command (or a preheating command). It is deactivated at the end of braking or deceleration or when the motor switches to freewheel mode after a STOP command. It is also deactivated when a fault occurs. The motor switches to freewheel mode at this point. - 9 = rIF: Fault relay. Relay R1 is activated when the starter is energized. Relay R1 is deactivated and the motor switches to freewheel mode when a fault occurs. Exception: When a resettable manually fault occurs, if the automatic restart function is active, the relay remains energized.			
R2 W4051	**Assignment of relay R2**		7	7
	The end of starting relay R2 is energized when the starter is powered up, no faults are present and the motor has completed the start-up phase. It is de-energized in the event of a stop request or a fault. It has one normally-open contact (N/O). It can be used to bypass the ATS 48 at the end of starting. This parameter cannot be modified and must not be written.			

* Activation of PTC probe monitoring assigned to ALA (W4106 = 2).

I/O Parameters

Code Address	Name	Unit	Range	Factory setting
R3 W4052	**Assignment of relay R3**		0 to 6	2
	- 0 = no: Not assigned. - 1 = tAI: Motor thermal alarm. - 2 = rnI: Motor powered up (indicates that there may be current in the motor). - 3 = AIL: Motor current alarm; Current Overload OIL assigned to ALA (W4108 = 2), threshold LOC (W4109) and time TOL (W4110) exceeded. - 4 = AUL: Motor underload alarm; Activation of motor underload assigned to ALA (W4103 = 2), threshold LUL (W4104) and time TUL (W4105) exceeded. - 5 = APC: Motor PTC probe alarm*. - 6 = AS2: Second set of motor parameters activated.			
AO W4024	**Assignment of analog output AO**		0 to 5	1
	- 0 = no: Not assigned. - 1 = OCr: Motor current - 2 = Otr: Motor torque - 3 = OtH: Motor thermal state - 4 = OCO: Cos φ - 5 = OPr: Active power			
0_4 W4053	**Configuration of the type of signal supplied by output AO**		0 to 1	0
	- 0 = 020 : 0 -20 mA signal - 1 = 420 : 4 -20 mA signal			
ASC W4025	**Scaling of the analog output max. signal**	%	50 to 500	200
	As a percentage of the nominal value of the configured parameter or 1 for the cos φ.			

* Activation of PTC probe monitoring assigned to ALA (W4106 = 2).

2nd Motor Parameters

The 2nd motor parameters can be accessed in both read and write mode. These parameters can only be modified with the motor stopped. They correspond to those parameters which can be accessed from the starter terminal St2 menu. They are only significant if a logic input, LI3 (W4022) or LI4 (W4048), has been assigned to the “activation of second set of motor parameters” function (LIS).

Code Address	Name	Unit	Range	Factory setting
IN2 W4300	**2nd motor nominal current**	0.1 A	0.4 to 1.3 ICL	(1)
	The description of parameter IN2 is identical to that for parameter IN (W4026), but applies to the second set of motor parameters.			
IL2 W4304	**2nd motor limiting current**	%	150 to 700	400
	The description of parameter IL2 is identical to that for parameter ILT (W4039), but applies to the second set of motor parameters. The limiting current IL2 is expressed as a % of IN2 and the limiting current equals IL2 x IN2.			
AC2 W4305	**2nd motor acceleration ramp time**	s	1 to 60	15
	The description of parameter AC2 is identical to that for parameter ACC (W4043), but applies to the second set of motor parameters.			
TQ2 W4302	**2nd motor initial starting torque**	%	0 to 100	20
	The description of parameter TQ2 is identical to that for parameter TQ0 (W4037), but applies to the second set of motor parameters.			
DE2 W4306	**2nd motor deceleration ramp time**	s	1 to 60	15
	The description of parameter DE2 is identical to that for parameter DEC (W4044), but applies to the second set of motor parameters.			
ED2 W4303	**Threshold for changing to freewheel stop mode at the end of 2nd motor deceleration**	%		
	The description of parameter ED2 is identical to that for parameter EDC (W4038), but applies to the second set of motor parameters.			
TL2 W4301	**2nd motor maximum torque limit**	%	9 to 200	
	The description of parameter TL2 is identical to that for parameter TLI (W4036), but applies to the second set of motor parameters.			
TI2 W4307	**2nd motor deceleration gain** for torque control	%	10 to 50	40
	The description of parameter TI2 is identical to that for parameter TIG (W4047), but applies to the second set of motor parameters.			

(1) ATS48•••Q: The factory setting for IN corresponds to the usual value of a 4-pole 400 V standardized motor with class 10 protection (see parameter THP / W4034).
ATS48•••Y: The factory setting for IN corresponds to the usual value of a 460 V standardized motor according to NEC, with class 10 protection (see parameter THP / W4034).

Communication Parameters

The communication parameters can be accessed in both read and write mode. These parameters can only be modified with the motor stopped. They can be accessed from the starter terminal COP menu.

Code Address	Name	Unit	Range	Factory setting
ADD W2290	**Starter address**		0 to 31	0
TBR W2292	**Communication speed**		6 to 8	8
	- 6 = 4.8 : 4800 bps - 7 = 9.6 : 9600 bps - 8 = 19.2 : 19200 bps			
FOR W2293	**Communication format**		2 to 5	4
	- 2 = 8o1: 8 data bits, odd parity, 1 stop bit - 3 = 8E1: 8 data bits, even parity, 1 stop bit - 4 = 8n1: 8 data bits, no parity, 1 stop bit - 5 = 8n2: 8 data bits, no parity, 2 stop bits			
TLP W2295	**Adjustment of the Modbus timeout**	0.1 s	1 to 600	50
	The time delay associated with this timeout is restarted each time the starter receives a Modbus frame. This timeout does not therefore only concern writing the control word CMD. ⚠ **Check that the time set will not interfere with safe operation of the machine.**			
PCT W2294	**Modbus configuration**		0 or 1	0
	- 0 = OFF: terminal port configuration; configures the starter to communicate with the remote terminal. This results in modification of parameters TBR (19200 bps, W2292 = 8) and FOR (8 n1, W2293 = 4) and **stopping of Modbus communication.** - 1 = On: Modbus configuration; parameters TBR and FOR revert to their initial value (saved to EEPROM). **After disconnecting the control voltage and switching back on, the socket is configured for Modbus.**			

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Control Parameters

The control parameters can be accessed in both read and write mode. These parameters may be modified with the motor stopped or running. They can only be accessed via the Modbus link.

Code Address	Name	Unit	Range	Factory setting
CMD W400	**Drivecom control register**			
	Bit 0 – "Switch on": (active at 1). **Bit 1 – "Disable Voltage"**: (active at 0). **Bit 2 – "Quick Stop"**: (active at 0). **Bit 3 – "Enable Operation"**: (active at 1). **Bits 4 to 6 – Reserved for Drivecom**. **Bit 7 – Reset faults**: active on rising edge 0 Õ 1. **Bit 8 – In LINE mode**: reserved for Drivecom. **In LOCAL mode** : (active at 1). **Bits 9 and 10 – Reserved for Drivecom**. **Bit 11 – Activation of the cascade function** : (active at 0). **Bit 12 – Stop request** according to the stop type configured by STY (W4029): (active at 1). **Bit 13 – Braked stop request**: (active at 1). **Bit 14 – Decelerated stop request**: (active at 1). **Bit 15 – LOCAL / LINE mode selection** Bit 15 = 0 and bit 8 = 0: Drivecom profile LINE mode. Bit 15 = 1 and bit 8 = 1: LOCAL mode			

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Code Address	Name	Unit	Range	Factory setting
CMI W402	**Extended control register**			

Bit 0 – Restore factory settings request: active on rising edge 0 Õ 1.
Once activated, this bit automatically changes to 0 after the request is taken into account. It is inactive if the motor is powered up.
Bit 1 – Store customer parameters request: active on rising edge 0 Õ 1.
Activation of this bit prompts saving of the configuration and adjustment parameters in the EEPROM, if there is sufficient voltage (excluding a USF fault). This bit automatically changes to 0 after the request is taken into account.

⚠ **The EEPROM's life is limited to 100,000 write operations. You should therefore make sure that this bit is used neither too regularly, nor pointlessly.**
Note: The stack of past faults is saved to the EEPROM each time the starter power supply is disconnected. See the description of parameter DP1 (W4203).

Bit 2 – Restore saved customer parameters request: Active on rising edge 0 Õ 1.
Activation of this bit prompts restoration of the configuration and adjustment parameters saved to the EEPROM. This bit is inactive if the motor is powered up. It automatically changes to 0 after the request is taken into account.
Bit 3 – EXT – External fault command: active on rising edge 0 Õ 1.
Once activated, this bit automatically changes to 0 after the request is taken into account. This triggers fault ETF (LFT / W4200 = 6).
Bit 4 – Reserved.
Bit 5 – Switch to second set of motor parameters: (active at 1).
Bits 6 to 9 – Reserved.
Bit 10 – Motor preheating request: active at 1. To activate this function, the starter must be in the "Operation Enabled" state, with no run command present. Used to prevent the motor from freezing or to prevent temperature deviations which may cause condensation. When the motor stops, an adjustable current IPR (W4045) flows through it after an adjustable time delay TPR (W4046), if the request has been activated. This current heats the motor without causing it to rotate. IPR and TPR should be adjusted.
Preheating starts when the request is present and the motor has stopped, after time delays TPR (W4046) and TBS (W4032) have elapsed.
Bit 11 – Disable protection request: active at 1.

⚠ **This type of use invalidates the starter warranty**.

Used to override the starter in the event of an emergency (smoke extraction, for example).
Bit 12 – Reserved.
Bit 13 – **Lock starter on stopping request**: active at 1.
Bit 14 – **Disable line monitoring**: Command with communication control (0) or command without communication control (No time out NTO) (1).

⚠ **For obvious safety reasons, activation of this bit should be reserved for the debug phase or for special applications.**

Bit 15 – Disable parameter consistency check: active at 1.
When this bit is at 1, there is no parameter consistency check, and the starter is locked when stopped. Switching this bit to 0 will revalidate all parameters.

Displayed Parameters

These parameters can be accessed in read-only mode. They have no “factory-set” value, since their value is updated in real time by the starter.
These parameters correspond to those parameters which can be accessed from the starter terminal SUP menu.

Code Address	Name	Unit	Range	Factory setting
COS W4067	**Cos** φ	0.01	0 to 100	
THR W4064	**Motor thermal state**	%	0 to 125 (nominal mode) or 0 to 250 (downgraded mode)	
	100% corresponds to the nominal thermal state for the nominal current In (W4026).			
LCR W4062	**Motor current**	0.1 A	(1)	
RNT W4068	**Operating time** since the last reset	hr	0 to 65,535	
	Operating time is counted when the motor is not stopped, i.e. when the thyristors are fired (heating, acceleration, steady state, deceleration, braking) and in continuous bypass operation. The hour counter is reset on line via control word RPR, by applying the value of trE (W4401 = 2) to it. This reset can also be performed, when the motor is stopped, from the starter terminal. When the starter is switched off, the hour counter is saved to the EEPROM. After a period in excess of 65,535 hours, or almost 7.5 years of continuous operation, the value of the RNT counter changes from 65535 to 0.			
LPR W4072	**Active power**	%	0 to 255	
	100% corresponds to the power at nominal current and at full voltage.			
LTR W4063	**Motor torque**	%	0 to 255	
	100% corresponds to the nominal torque.			
LAP W4073	**Active power in kW**	kW	0 to 999	
	This parameter requires configuration of the exact value of the voltage ULn (W4055) or drC menu.			

Displayed Parameters

Code Address	Name	Unit	Range	Factory setting
LFT W4200	**Last fault**		0 to 21	
	- 0 = NOF: No fault - 1 = INH: Inhibit protection/faults - 2 = INF: Internal fault - 3 = OCF: Short-circuit/overcurrent fault - 4 = PIF: Phase inversion - 5 = SLF: Line communication fault - 6 = ETF: External fault - 7 = STF: Excessive starting time - 8 = USF: Voltage fault - 9 = PHF: Phase, line or motor fault - 10 = OHF: Starter thermal fault - 11 = LRF: Rotor fault - 12 = OLF: Motor thermal fault - 13 = FRF: Frequency fault - 14 = ULF: Motor underload fault - 15 = EEF: EEPROM fault - 16 = OLC: Current overload fault - 17 = CFI: Invalid configuration - 18 = OTF: Motor thermal fault detected by the PTC probes - 19 = Unused - 20 = CFF: Invalid configuration requiring factory settings - 21 = CLF: Loss of control supply			
PHE W4065	**Phase rotation direction** viewed from the starter		0 to 2	
	- 0 = no: no direction recognized - 1 = 123 : forward - 2 = 321 : reverse			

Monitoring Parameters

Code Address	Name	Unit	Range	Factory setting
COD W64007	**Terminal locking code**		0 to 998	
	Enables the starter configuration to be protected by an access code. When access is locked, only the displayed parameters (SUP menu) can be accessed from the terminal. Access via the line (configuration, adjustment, control, monitoring) are not affected. Locking is possible from the terminal or the line. The COD parameter (although in the category of displayed parameters) can be modified, when the motor is stopped. ⚠ **Do not lose the code.** - 0 = OFF: No code. - 1 = On: Access is locked, the code is not visible. - 2 to 998: A code is present, but the display unit is not locked. • To lock it: Write the code xxx, a number between 0 and 998. (Next reading: COD = 1). • To unlock: Write the code xxx which was used to lock the starter. (Next reading: COD = xxx). • To delete the code: Unlock Write COD = 0. (Next reading: COD = 0). • Changing the code Ensure there is no code (0) or that the code is visible (2 to 998). Write a new code. (Next reading: COD = 1). • Switch off if a code is present. Then switch the control part back on. The terminal is locked. Read COD = 1.			

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Monitoring Parameters

The monitoring parameters can be accessed in read-only mode. They have no “factory-set” value, since their value is updated in real time by the starter.
These parameters are the same type as the parameters described in the previous section (Displayed Parameters), but they cannot be accessed via the starter terminal menus.

Code Address	Name	Unit	Range	Factory setting
ETA W458	**Drivecom status register**			
	Bit 0 – “Ready to switch on”: active at 1. **Bit 1 – “Switched on”**: active at 1. **Bit 2 – “Operation enabled”**: active at 1. **Bit 3 – “Malfunction”**: absence of faults (0) / “Malfunction” Drivecom status active and fault present (1). **Bit 4 – No power / “Voltage disabled”**: active at 1. **Bit 5 – “Quick stop” active**: active at 0. **Bit 6 – “Switch on disabled”**: active at 1. **Bit 7 – Alarm present**: active at 1. **Bit 8** – Reserved for Drivecom. **Bit 9** – **FORCED LOCAL active**: active at 0. **Bit 10 to 15** – Reserved.			
ETI W459	**Extended status register**			
	Bit 0 – Write parameter authorization: Parameter writing authorized (0) / Parameter writing not authorized (1). Parameters cannot be written when saving to EEPROM is already in progress. **Bit 1 – Parameter consistency check**: No parameter consistency check and drive locked when stopped (0) / parameter consistency check (1). **Bit 2 – Starter reset authorization**: Fault reset not authorized (0) / fault reset authorized (1). **Bit 3 – Motor preheating**: active at 1. **Bit 4 – Motor operating status**: Motor stopped (0) / motor running (1). When this bit is at 1, it means that the motor is either running, or subject to a time delay before starting. **Bit 5 – Braking active**: active at 1. **Bit 6 – Starter in continuous operation**: Transient state (0) / steady state (1). **Bit 7 – Thermal overload alarm**: active at 1. **Bit 8** – Reserved. **Bit 9 – Starter accelerating**: active at 1. **Bit 10 – Starter decelerating**: active at 1. **Bit 11 – Current limit alarm**: active at 1. **Bit 12** – **Torque limit alarm**: active at 1. **Bits 13 and 14 – Active mode** Bit 14 = 0 and Bit 13 = 0: LOCAL mode or FORCED LOCAL mode. Bit 14 = 1 and Bit 13 = 0: State not possible. Bit 14 = 1 and Bit 13 = 0: LINE mode (ATS46 profile); see **Compatibility with the ATS46** section. Bit 14 = 1 and Bit 13 = 1: LINE mode (Drivecom profile). **Bit 15** – Reserved.			

Monitoring Parameters

Code Address	Name	Unit	Range	Factory setting
ETI2 W460	**Extended status register no. 2**			
	Bits 0 to 5 – Reserved. **Bit 6 – Current overload threshold (CTD)**: Threshold not reached (0) / threshold reached (1). **Bits 7 to 9** – Reserved. **Bit 10 – Underload threshold** : active at 1. **Bit 11 – PTC probe motor thermal protection threshold**: Threshold not reached (0) / threshold reached (1). **Bit 12 – Use of second motor configuration** : use normal parameter set (0) / use parameter set relating to 2nd motor (1). **Bit 13 – Time delay before starting**: active (1) / complete (0). **Bit 14 – Cascade operation**: active at 1. **Bit 15** – Reserved.			
AOR W4070	**Image of analog output AO**	0.002 mA	0 to 10,000 (0 to 20 mA)	
	The analog output AO is assigned using parameter AO (W4024). It is either a 0-20 mA or 4-20 mA output, depending on the value of parameter 0_4 (W4053).			
DP1 W4203	**Code for past fault no. 1**			
	The last 5 faults are saved to DP1, DP2, DP3, DP4 and DP5. DP1 is the most recent and DP5 the oldest. The format of these parameters is identical to LFT (W4200). However, configuration fault CFI, loss of control supply fault CLF and EEPROM fault EEF are not saved. The Inhibit protection/ faults event INH is saved. All 5 parameters DP1 to DP5 are saved to the EEPROM if the power supply is disconnected.			
DP2 W4206	**Code for past fault no. 2**			
	Same as parameter DP1 (W4203), but applied to past fault no. 2.			
DP3 W4209	**Code for past fault no. 3**			
	Same as parameter DP1 (W4203), but applied to past fault no. 3.			
DP4 W4212	**Code for past fault no. 4**			
	Same as parameter DP1 (W4203), but applied to past fault no. 4.			
DP5 W4215	**Code for past fault no. 5**			
	Same as parameter DP1 (W4203), but applied to the oldest fault.			

Monitoring Parameters

Code Address	Name	Unit	Range	Factory setting
EP1 W4205	**State during past fault no. 1**			
	Bit 0: *Same as* Bit 4 of ETA: No power / "Voltage disabled" (active at 1). Bit 1: *Same as* Bit 12 of ETI: Torque limit alarm (active at 1). Bit 2: *Same as* Bit 6 of ETA: “Switch on disabled” Drivecom status (active at 1). Bit 3: *Same as* Bit 9 of ETA: FORCED LOCAL in progress (active at 0). Bit 4: *Same as* Bit 3 of ETI: Motor preheating (active at 1). Bit 5: *Same as* Bit 4 of ETI: Motor stopped (0) / motor running (1). Bit 6: *Same as* Bit 5 of ETI: Braking in progress (active at 1). Bit 7: *Same as* Bit 7 of ETI: Thermal overload alarm (active at 1). Bit 8: *Same as* Bit 9 of ETI: Starter not accelerating (0) / accelerating (1). Bit 9: *Same as* Bit 10 of ETI: Starter not decelerating (0) / decelerating (1). Bit 10: *Same as* Bit 11 of ETI: Current limit alarm (active at 1). Bit 11: *Same as* Bit 13 of ETI2: Time delay before starting in progress (1) / complete (0). Bits 12 and 13: *Same as* Bits 13 and 14 of ETI: Active mode. Bit 13 = 0 and Bit 12 = 0: LOCAL mode. Bit 13 = 1 and Bit 12 = 0: State not possible. Bit 13 = 1 and Bit 12 = 0: LINE mode (ATS46 profile). Bit 13 = 1 and Bit 12 = 1: LINE mode (Drivecom profile). Bit 14: *Same as* Bit 12 of ETI2: Use normal parameter set (0) / use parameter set relating to 2nd motor (1) Bit 15: *Same as* Bit 14 of ETI2: Cascade operation (active at 1).			
EP2 W4208	**State during past fault no. 2**			
	Same as register EP1 (W4205), but applied to past fault no. 2.			
EP3 W4211	**State during past fault no. 3**			
	Same as register EP1 (W4205), but applied to past fault no. 3.			
EP4 W4214	**State during past fault no. 4**			
	Same as register EP1 (W4205), but applied to past fault no. 4.			
EP5 W4217	**State during past fault no. 5**			
	Same as register EP1 (W4205), but applied to the oldest fault.			
HD1 W4204	**Time of past fault no. 1**	hr	0 to 65635	
	The format and operation of this parameter are identical to those of RNT (W4068).			
HD2 W4207	**Time of past fault no. 2**	hr	0 to 65635	
	Same as parameter HD1 (W4204), but applied to past fault no. 2.			
HD3 W4210	**Time of past fault no. 3**	hr	0 to 65635	
	Same as parameter HD1 (W4204), but applied to past fault no. 3.			
HD4 W4213	**Time of past fault no. 4**	hr	0 to 65635	
	Same as parameter HD1 (W4204), but applied to past fault no. 4.			
HD5 W4216	**Time of past fault no. 5**	hr	0 to 65635	
	Same as register HD1 (W4204), but applied to the oldest fault.			

Monitoring Parameters

Code Address	Name	Unit	Range	Factory setting
IOL W4066	**State of logic I/O**			
	Bit 0: Logic input LI3 (0 – low state / 1 – high state). Bit 1: Logic output LO1 (0 – low state / 1 – high state). Bit 2: Logic output LO2 (0 – low state / 1 – high state). Bit 3: Relay R1 (0 – open / 1 – closed). Bit 4: Relay R2 (0 – open / 1 – closed). Bit 5: Reserved. Bit 6: Logic input LI_RUN (0 – low state / 1 – high state). Bit 7: Logic input LI_STOP (0 – low state / 1 – high state). Bit 8: Reserved. Bit 9: Logic input LI4 (0 – low state / 1 – high state). Bit 10: Relay R3 (0 – open / 1 – closed). Bits 11 to 15: Reserved.			
KWH W4074	**Power consumption**	kWh	0 to 65,535	
	In order to use this parameter correctly, it is necessary to configure the exact value of the line voltage ULn via parameter ULN (W4055).			
RNTT W4075	**Operating time**	hr	0 to 65,535	
	The operating principle and this format of this register are the same as those of RNT (W4068), but it is impossible to reset it.			

Identification Parameters

The product identification parameters can be accessed in read-only mode. They do not appear in any of the starter terminal menus and are arranged here in ascending alphabetical order of their “Code”.

The Identification service (code 65) can be used to obtain additional information.

Code Address	Name	Unit	Range	Factory setting
ICL W4503	**Starter rating**	0.1 A	0 to 12,000	
NCD W4505	**Code for starter rating**		0 to 21	
	- 0 : Unknown rating - 1 : 7.5 kW - 2 : 11 kW - 3 : 15 kW - 4 : 18.5 kW - 5 : 22 kW - 6 : 30 kW - 7 : 37 kW - 8 : 45 kW - 9 : 55 kW - 10 : 75 kW - 11: 90 kW - 12: 110 kW -13: 132 kW -14: 160 kW -15: 220 kW -16: 250 kW -17: 315 kW -18: 355 kW -19: 400 kW -20: 500 kW -21: 630 kW			
TSP W4502	**Product software type**			
VCAL W4504	**Starter range**		0, 1 or 2	
	- 0 : Unknown - 1 : Q range - 2 : Y range			
VSP W4501	**Product software version**			
	Bits 0 to 7: Software upgrade index, expressed in hexadecimal notation. Bits 8 to 15: Software version, expressed in hexadecimal notation.			

Compatibility with ATS46

Principle

An ATS48 can be fitted instead of an ATS46 controlled in Modbus RTU mode.

There is no compatibility with applications using Modbus ASCII or Unitelway.

For new applications, we recommend using ATS48 functions and parameters. Telemecanique does not make any commitment to reproducing this compatibility on future ranges.

Operation of the ATS46 on Modbus RTU is described in the user's manual "Altistart 46 - Communication option VW3G46301" (reference VDOC32Q303).

All the ATS46 parameters are:
- either identical to those of the ATS48
- or emulated by equivalent parameters.

Management of the starter according to the " ATS46 compatibility" profile is only possible using control register CMD6 (W4060) and status register ETA6 (W4061).

The ATS46 profile is activated on the ATS48 as soon as there is a write operation to control register CMD6 (W4060). When the ATS46 profile is activated, we do not recommend the use of parameters specific to the ATS48.

In particular, CMD must not be used, otherwise the starter switches to the Drivecom profile. It remains in this profile as long as the starter is powered up.

Compatibility with ATS46

Parameters common to the ATS46 and ATS48

Address	Code		Name
	ATS46	ATS48	
W2290	ADR	ADD	Starter address via the RS485 (Modbus) serial link
W2292	SPD	TBR	Communication speed in kbps
W2293	FOR		Communication format
W2294	PCT		Configuration of the serial link
W2295	TLP		Adjustment of the serial link timeout
W4022	LI	LI3	Assignment of logic input LI3
W4023	LO1		Assignment of logic output LO1
W4024	AO		Assignment of analog output AO
W4025	ASC		Scaling of the analog output max. signal
W4026	IN		Nominal motor current
W4027	LSC		Stator loss compensation
W4028	BST		Voltage boost level
W4029	STY		Selection of the stop type
W4030	PHR		Protection against line phase inversion
W4031	ULL	ULL6	ATS46 motor underload threshold
W4032	TBS		Time before restarting
W4033	TLS		Excessive starting time
W4034	THP		Motor thermal protection
W4035	CNF		Configuration register
W4036	TLI		Maximum torque limit
W4037	TQ0		Initial starting torque
W4038	EDC		Threshold for changing to freewheel stop mode at the end of deceleration
W4039	ILT		Limiting current
W4040	OIL	OIL6	ATS46 current overload threshold
W4041	BRC		Internal braking torque level
W4042	EBA		Pseudo-continuous braking time
W4043	ACC		Acceleration ramp time
W4044	DEC		Deceleration ramp time
W4045	IPR		Preheating level
W4046	TPR		Time delay before preheating
W4047	GKI	TIG	Deceleration gain for torque control Note: The range of this parameter equals [20 ; 50] in the case of the ATS46, and [10 ; 50] in the case of the ATS48.
W4061	ETA	ETA6	ATS46 status register
W4062	LCR		Motor current
W4063	LTR		Motor torque (motor load status)
W4064	LTH	THR	Motor thermal state
W4065	PHE		Phase rotation direction viewed from the starter

Compatibility with ATS46

Parameters common to the ATS46 and ATS48 (continued)

Address	Code		Name
	ATS46	ATS48	
W4066	LIO	IOL	State of logic I/O Bit 9 is either reserved (ATS46), or is the image of LI4 (ATS48).
W4067	COS		Cos φ
W4068	TFR	RNT	Operating time since the last reset
W4069	DFT	DF1	ATS46 fault register
W4070	SAO	AOR	Image of analog output AO
W4071	–	ETT6	ATS46 additional status register
W4072	LPR		Active power

Caution: parameter PRO (W2291) does not exist in the ATS48.

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Compatibility with ATS46

ATS46 control bits

The following table describes all the ATS46 control bits. They can only be accessed using Modbus functions 1 (read N output bits), 2 (read N input bits) et 5 (write one output bit). These functions are supported by the ATS48 in the ATS46 profile. They are described in the user's manual ***Altistart 46 - Communication option***.

The notation "B•" used below is similar that used for parameters "W••••". Hence, for example, B4 corresponds to bit number 4, ie. to NTO.

Address	Code	Name
B0	RST	Generator reset command
B1	DLI	Assignment of LINE/LOCAL commands
B2	EXT	External fault
B3	–	Reserved
B4	NTO	Suppression of communication control
B5	RUN	Run command
B6	CAF	Braked stop request
B7	CAD	Decelerated stop request
B8	CAL	Freewheel stop request
B9	–	Reserved

Compatibility with ATS46

Parameters specific to the Altistart 48

Address	ATS48 code	Name
W400	CMD	Drivecom/VVD control register
W402	CMI	Internal control register
W458	ETA	Drivecom/VVD status register
W459	ETI	Internal status register no. 1
W460	ETI2	Internal status register no. 2
W4048	LI4	Assignment of logic input LI4
W4049	LO2	Assignment of logic output LO2
W4050	R1	Assignment of relay R1
W4051	R2	End of starting relay R2 (cannot be assigned)
W4052	R3	Assignment of relay R3
W4053	0_4	Configuration of the type of signal supplied by output AO
W4054	DLT	Starter with delta winding connection
W4055	ULN	Line voltage
W4056	FRC	Line frequency
W4057	SST	Test on small motor
W4058	CSC	Activation of the cascade function
W4073	LAP	Active power
W4074	KWH	Power consumption
W4075	RNTT	Product operating time
W4100	ARS	Automatic restart
W4101	PHL	Phase loss threshold
W4102	PHP	Activation of phase loss
W4103	ULL	Activation of motor underload
W4104	LUL	Motor underload threshold
W4105	TUL	Motor underload time
W4106	PTC	Activation of motor thermal monitoring by PTC probes
W4107	CLP	Torque control
W4108	OIL	Activation of current overload
W4109	LOC	Current overload threshold
W4110	TOL	Current overload time
W4200	LFT	Last fault detected
W4203	DP1	Code for past fault no. 1

Compatibility with ATS46

Address	ATS48 code	Name
W4204	HD1	Time of past fault no. 1
W4205	EP1	State of past fault no. 1
W4206	DP2	Code for past fault no. 2
W4207	HD2	Time of past fault no. 2
W4208	EP2	State of past fault no. 2
W4209	DP3	Code for past fault no. 3
W4210	HD3	Time of past fault no. 3
W4211	EP3	State of past fault no. 3
W4212	DP4	Code for past fault no. 4
W4213	HD4	Time of past fault no. 4
W4214	EP4	State of past fault no. 4
W4215	DP5	Code for past fault no. 5
W4216	HD5	Time of past fault no. 5
W4217	EP5	State of past fault no. 5
W4300	IN2	2nd motor nominal current
W4301	TL2	2nd motor maximum torque limit
W4302	TQ2	2nd motor initial starting torque
W4303	ED2	Threshold for changing to freewheel stop mode at the end of 2nd motor deceleration
W4304	IL2	2nd motor limiting current
W4305	AC2	2nd motor acceleration ramp time
W4306	DE2	2nd motor deceleration ramp time
W4307	TI2	2nd motor deceleration gain for torque control
W4401	RPR	Reset kWh or operating time
W4402	RTH	Reset motor thermal state
W4501	VSP	Product software version
W4502	TSP	Product software type
W4503	ICL	Starter rating current
W4504	VCAL	Starter range
W4505	NCD	Starter rating number
W64007	COD	Terminal locking code

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